



# UNITED STATES PATENT AND TRADEMARK OFFICE

*len*  
UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/604,692	08/11/2003	HSIANG-LAN LUNG	10156-US-PA	1691
31561 7590 06/29/2007 JIANQ CHYUN INTELLECTUAL PROPERTY OFFICE 7 FLOOR-1, NO. 100 ROOSEVELT ROAD, SECTION 2 TAIPEI, 100 TAIWAN			EXAMINER WARREN, MATTHEW E	
			ART UNIT 2815	PAPER NUMBER
			NOTIFICATION DATE 06/29/2007	DELIVERY MODE ELECTRONIC

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

USA@JCIPGROUP.COM.TW

<b>Office Action Summary</b>	Application No. 10/604,692	Applicant(s) LUNG ET AL.	
	Examiner Matthew E. Warren	Art Unit 2815	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 10 April 2007.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1,4-6,8-12 and 35-37 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,4-6,8-12 and 35-37 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                                | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                       | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

### DETAILED ACTION

This Office Action is in response to the RCE and Amendment filed on April 2, 2007.

#### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 4-6, 8-10, 12, and 35-37 are rejected under 35 U.S.C. 102(b) as being anticipated by Yoshikawa (US 6,335,554 B1).

In re claims 1 and 35, Yoshikawa shows (fig. 1) a split-gate non-volatile memory cell, comprising: a substrate (1); a charge-trapping layer (4a) on the substrate; a split gate (3 and 8) on the charge-trapping layer, including two or more separate conductive pieces (3 and 8) shorted with each other (connected with layer 12), wherein any two neighboring conductive pieces have two opposite edge portions over the charge trapping layer that together cause, in operation of the memory cell, a stronger electric field such that only one coding region is defined, by the two neighboring conductive pieces, in the charge-trapping layer around the two opposite edge portions; and a source/drain region (11) in the substrate besides the split gate.

In re claim 4, Yoshikawa shows (fig. 1) the conductive pieces of the split gate include a pair of conductive spacers (8) and a conductive layer (3) between the pair of conductive spacers.

In re claim 5, Yoshikawa shows (fig. 1) the pair of conductive spacers (8) are arranged with two substantially vertical sidewalls thereof adjacent to the source/drain (10, 11)

In re claim 6, Yoshikawa shows (fig. 1) an insulator (4a, 4b) on the source/drain, wherein the pair of conductive spacers (8) are disposed on the sidewalls of the insulator.

In re claim 8, Yoshikawa shows (fig. 1) the conductive pieces (3, 8) are separated from each other by a dielectric layer (4a, 4b).

In re claim 9, Yoshikawa discloses (col. 7, lines 31-44) that the split gate comprises polysilicon.

In re claim 10, Yoshikawa discloses (col. 7, lines 45-55), the charge-trapping layer comprises a silicon nitride layer disposed between two silicon oxide layers.

With regards to remaining limitations of claim 35, and claims 36-37, the claimed "programming operation" is not considered to add any structure to the claimed device and is considered to be intended use of the device. It has been held that a recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus satisfying the claimed structural limitations. *Ex parte Masham*, 2 USPQ2d 1647 (1987).

In re claim 12, Yoshikawa shows (fig. 1) that the substrate comprises a p-substrate (1), and the source/drain comprises an n-type source/drain (11).

Claim 11 is rejected under 35 USC § 103 (a) as being unpatentable over Yoshikawa (US 6,335,554 B1) applied to claim 1 above, and further in view of Schwabe et al. (US 4,257,832).

In re claim 11, Yoshikawa does not show the charge-trapping layer comprising aluminum oxide ( $\text{Al}_2\text{O}_3$ ). Schwabe discloses in col. 3, lines 11-15 a charge-trapping layer comprises aluminum oxide ( $\text{Al}_2\text{O}_3$ ). It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the trapping layer of Yoshikawa by using  $\text{Al}_2\text{O}_3$  as a tunnel oxide taught by Schwabe to form a suitable charge trapping layer.

### ***Response to Arguments***

Applicant's arguments with respect to claims 1, 4-6, 8-12 and 35-37 have been considered but are moot in view of the new ground(s) of rejection.

### ***Conclusion***

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Harari (US 6,888,755) shows a configuration (fig. 11) wherein two neighboring conductive pieces define a strong electric field in an underlying oxide

Art Unit: 2815

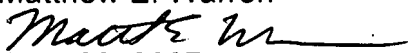
layer, however Harari discloses in that embodiment that it is not desirable to trap the electric field in the oxide layer.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Matthew E. Warren whose telephone number is (571) 272-1737. The examiner can normally be reached on Mon-Thur and alternating Fri 9:00-5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kenneth Parker can be reached on (571) 272-2298. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Matthew E. Warren

  
June 22, 2007